

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings of claims in the application:

1-5. (Canceled)

6. (Withdrawn) A method of manufacturing a proton exchange fuel cell, comprising:
preparing a separator substrate; and

forming a multi-coating layer on said separator substrate by a process, capable of forming a thin film, selected from the group consisting of a physical evaporation process, a chemical evaporation process, a nitride treating process, a boride treating process, a carbonizing process, a plating process and a spraying process.

7. (Withdrawn) The method according to claim 6, wherein said forming of said multi-coating layer comprises:

forming a peeling resistance layer on said separator substrate;

forming a corrosion resistance layer on said peeling resistance layer; and

forming a low electric resistance layer on said corrosion resistance layer.

8. (Withdrawn) The method according to claim 7, wherein in said step of forming said multi-coating layer, said multi-coating layer is formed using said plating process such that a film thickness of said low electric resistance layer is 0.02 μm or more, a film thickness of said corrosion resistance layer is 0.1 μm or more, and a film thickness of said peeling resistance layer is 0.1 μm or more.

9. (Withdrawn) The method according to claim 7, wherein in said step of forming said multi-coating layer, said multi-coating layer is formed using said physical evaporation plating process such that the film thickness of said low electric resistance layer is $1.0\text{ }\mu\text{m}$ or more, the film thickness of said corrosion resistance layer is $1.0\text{ }\mu\text{m}$ or more, and the film thickness of said peeling resistance layer is $1.0\text{ }\mu\text{m}$ or more.

10. (Withdrawn) The method according to claim 9, wherein a crystal orientation of each layer of said multi-coating layer is oriented to a direction of a Miller index of (200) or (002).

11. (Withdrawn) The method according to claim 9, wherein a porosity in said multi-coating layer is $5 \times 10^0\%$ or less in terms of defective area rate.

12. (Withdrawn) The method according to claim 6,
wherein a material for said multi-coating layer formed on said separator substrate comprises one kind or a composite alloy material of two or more kinds of materials having a lower electric resistance than that of said separator substrate of metallic material, ceramics material and cermet material.

13. (Withdrawn) The method according to claim 6, further comprising:
electrically, mechanically or chemically removing a passive state film or an oxide existing on said separator substrate before said forming of said multi-coating layer.

14. (Withdrawn) A method of manufacturing a separator of a proton exchange fuel cell, comprising:

preparing a separator substrate; and

forming a multi-coating layer on said separator substrate by a process, capable of forming a thin film, selected from the group consisting of a physical evaporation process, a chemical evaporation process, a nitride treating process, a boride treating process, a carbonizing process, a plating process and a spraying process;

removing said multi-coating layer electrically, mechanically or chemically, so that said multi-coating layer and said separator substrate are individually recovered; and

reusing material of said recovered multi-coating layer in manufacturing of said-proton exchange fuel cell.

15. (Withdrawn) The method according to claim 14, further comprising:

after recovering said separator substrate, pulverizing and resolving said recovered separator substrate electrically, mechanically or chemically; and

reusing material of said recovered separator substrate in manufacturing of said proton exchange fuel cell.

16-18. (Canceled)

19. (Previously Presented) A proton exchange fuel cell, comprising:

a separator which comprises

a separator substrate; and

a multi-coating layer formed on said separator substrate;

wherein said multi-coating layer comprises a peeling resistance layer provided on said separator substrate, a corrosion resistance layer provided on said peeling resistance layer, and a low electric resistance layer provided on said corrosion resistance layer;

wherein a material of said low electric resistance layer has an electric resistance of equal to or lower than $1000 \mu \Omega \text{cm}^2$;

wherein said separator substrate comprises one kind or a composite material of two or more kinds of materials selected from the group consisting of stainless steel, copper, an alloy of copper, aluminum, an alloy of aluminum, titanium and an alloy of titanium;

wherein said multi-coating layer comprises one kind or a composite material of two or more kinds of materials having a low contact resistance selected from the group consisting of Ni, Fe, Co, B, Pb, Cr, Cu, Ti, Bi, Sn, W, P, Mo, Ag, Pt, Au, TiC, NbC, TiCN, TiN, CrN, TiB₂, ZrB₂, Fe₂B, and Si₃N₄;

wherein a film thickness of said low electric resistance layer is $0.02 \mu \text{m}$ or more, a film thickness of said corrosion resistance layer is $0.1 \mu \text{m}$ or more, and a film thickness of said peeling resistance layer is $0.1 \mu \text{m}$ or more.

20. (Currently Amended) ~~The proton exchange fuel cell according to claim 1,~~

A proton exchange fuel cell, comprising:

a separator which comprises

a separator substrate; and

a multi-coating layer formed on said separator substrate;

wherein said multi-coating layer comprises a peeling resistance layer provided on said separator substrate, a corrosion resistance layer provided on said peeling resistance layer, and a low electric resistance layer provided on said corrosion resistance layer;

wherein a material of said low electric resistance layer has an electric resistance of equal to or lower than $1000 \mu \Omega \text{cm}^2$;

wherein said separator substrate comprises one kind or a composite material of two or more kinds of materials selected from the group consisting of stainless steel, copper, an alloy of copper, aluminum, an alloy of aluminum, titanium and an alloy of titanium;

wherein said multi-coating layer comprises one kind or a composite material of two or more kinds of materials having a low contact resistance selected from the group consisting of Ni, Fe, Co, B, Pb, Cr, Cu, Ti, Bi, Sn, W, P, Mo, Ag, Pt, Au, TiC, NbC, TiCN, TiN, CrN, TiB₂, ZrB₂, Fe₂B, and Si₃N₄;

wherein ~~the~~ a film thickness of said low electric resistance layer is 1.0 μm or more, ~~the~~ a film thickness of said corrosion resistance layer is 1.0 μm or more, and ~~the~~ a film thickness of said peeling resistance layer is 1.0 μm or more.

BASIS FOR THE AMENDMENT

Claims 1, 3 and 16-18 have been canceled.

Claim 20 has been rewritten in independent form to include the limitations of Claim 1.

No new matter is believed to have been added by entry of this amendment. Entry and favorable reconsideration are respectfully requested.

Upon entry of this amendment Claims 6-15 and 19-20 will now be active in this application. Claims 6-15 stand withdrawn from further consideration.